SWH-2024D

24 Ports NWay Ethernet Switch

User's Manual

V2.0

FCC Warning

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limitations are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if no installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into a different outlet from that the receiver is connected.
- Consult your local distributors or an experienced radio/TV technician for help.
- Shielded interface cables must be used in order to comply with emission limits.

Changes or modifications to the equipment, which are not approved by the party responsible for compliance could affect the user's authority to operate the equipment.

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Table of Contents

1. Unpacking Information

2. Introduction To SWH-2024D NWay Switching Hub

2.1 General Description
2.2 Key Features
2.3 The Front Panel
2.3.1 System LEDs
2.3.1.1 Power LED
2.3.1.2 Module/Fiber Link LED
2.3.1.3 VLAN/Port Trunk LEDs
2.3.1.4 Slide-in module LEDs
2.3.2 Port LEDs
2.3.2.1 Link/Act LED
2.3.2.2 FDX/COL LED
2.3.3 Uplink Port
2.3.4 VLAN/Trunk Mode Button
2.3.5 Reset Button
2.4 The Rear Panel
2.4.1 Power Connecting
2.4.2 Console Port

3. Installing And Using SWH-2024D NWay Switching Hub

3.1 Installing The SWH-2024D NWay Switching Hub
3.1.1 Desktop Installation
3.1.2 Rack-Mount Installation
3.1.3 Installing Network Cables
3.1.3.1 Station Connection with Twisted-Pair Cable
3.1.3.2 Switch to Switch Connections with Twisted-Pair Cable
3.1.3.3 Network Application

4. Switching Operation

4.1 MAC Address Table & Learning
4.2 Filtering and Forwarding
4.3 Store and Forward

5. Console Program

6. Product Specifications

1. Unpacking Information

Thank you for purchasing the SWH-2024D NWay switching hub. Before you start, please check all the contents of this package.

The product package should include the following:

1. One SWH-2024D NWay switching hub

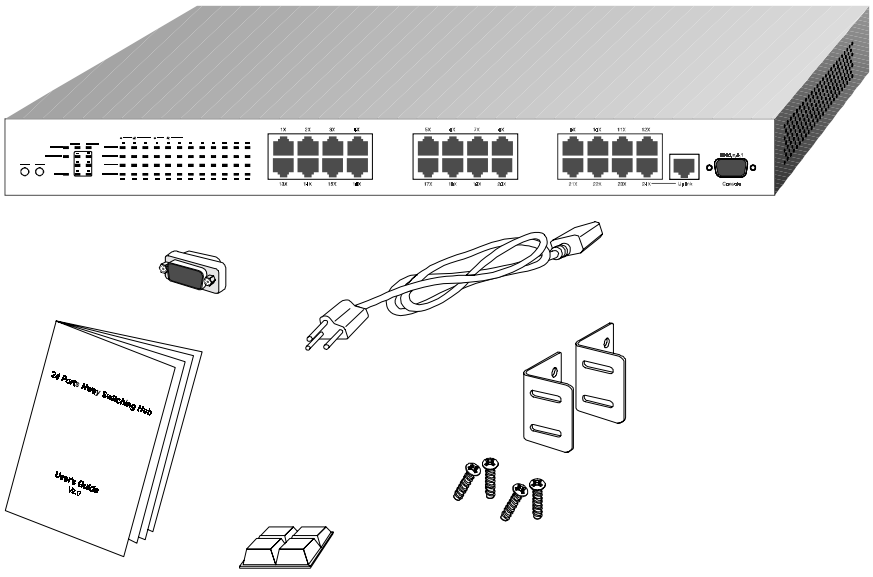
2. One power cord

3. Screws and rubber foot

4. Null modem adapter

5. Rack-mount brackets

6. User's guide



2. Introduction To SWH-2024D NWay Switching Hub

2.1 General Description

The device is a powerful, high-performance Fast Ethernet switching hub, with all 24 ports capable of 10 or 100Mbps auto-negotiation operation (NWay) which means the switch could automatically negotiate with the connected partners on the network speed and duplex mode. It is ideal for micro-segmenting large networks into smaller, connected subnets for improved performance, enabling the bandwidth demanding multimedia and imaging applications. Moreover, the 10/100Mbps auto-sensing ability provides an easy way to migrate 10Mbps to 100Mbps networks with no pain. Compared to the shared 10Mbps or 100Mbps networks, the switching hub delivers a dedicated 10/100Mbps connection to every attached client with no bandwidth congestion issue.

The switching hub also supports more value-added function include port trunk and virtual LAN. Port trunk function could be used to build up a fat pipe up to 800Mbps between switches that will solve the bandwidth bottleneck on backbone connection. Virtual LAN provides system security function which keep the resources only could be shared in the same virtual group and all the other nodes did not belong to the group can not access the resources.

Store-and-forward switching mode promises the low latency plus eliminates all the network errors, including runt and CRC error packets. To work under full-duplex mode, transmission and reception of the frames can occur simultaneously without causing collisions as well as double the network bandwidth.

The switching hub is plug-n-play without any software to configure and also fully compliant with all kinds of network protocols. Moreover, the rich diagnostic LEDs on the front-panel for providing the operating status of individual port and whole system.

For network connection:

The switching hub can use the following types of cabling:

- 10BASE-T Category 3, 4 or 5 UTP/STP
- 100BASE-TX Category 5 UTP/STP

Category 5 cable is preferred to be using with this product in structured wiring environments. This will ensure correct operation of all ports at 10Mbps or 100Mbps.

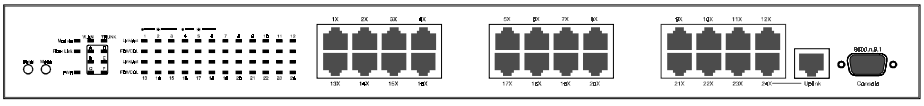
2.2 Key Features

The switching hub provides the following key features:

- Complies with 10BASE-T specifications of the IEEE802.3 standard
- Complies with 100BASE-TX specifications of the IEEE802.3u standard
- Twenty-four RJ-45 ports for 100Base-TX and 10Base-T connectivity
- Supports NWay protocol for speed (10/100Mbps) and duplex mode (Half/Full) auto-detection
- One uplink port for cascading switch to switch or switch to hub with no cross-over cable
- Supports full and half duplex operation on all ports
- Supports one mode button for reviewing the port trunk and VLAN configuration
- Supports one system reset button
- Optional slide-in module support 100BASE-FX connection
  (The slide-in module is an alternative port to port 12 which means both ports can not work at the same time)
- Wire-speed packet filtering and forwarding rate
- Store-and-forward architecture filters fragment & CRC error packets
- Supports 1K MAC address entries in whole system
- 3MBytes buffer memory
- Supports extensive LED indicators for network diagnostics
- Internal universal switching power supply (100 ~ 240VAC)
- FCC Class A, CE

2.3 The Front Panel

The front panel of the switching hub is shown below.



The auto-negotiation feature of the switching hub allows each port of the device running at one of the following four operation modes:

1. 100Mbps full-duplex
2. 100Mbps half-duplex
3. 10Mbps full-duplex
4. 10Mbps half-duplex

Port 24 can be used as an uplink port for connecting to another unit without using crossover cable. When using the uplink port, you can extend the distance to 100m for linking another switch or hub.

2.3.1 System LEDs

System LED indicators are located on the front panel for showing the operating status of the whole device.

2.3.1.1 Power LED

This indicator lights green when the hub is receiving power; otherwise, it is off.

2.3.1.2 Module/Fiber Link LED

When the fiber optional module slide into the system then the module LED will be green. The fiber link LED shows the link status of the optional module.

2.3.1.3 VLAN/Port Trunk LEDs

When the VLAN LED is light, the group LEDs (A~F) represent the VLAN groups. If the Trunk LED is light then the group LEDs (A~F) mean the trunk groups. For example: when the VLAN group A is selected, the VLAN LED, group A LED and the link/act LED of the ports in the VLAN group A will light. Same situation for port trunk.

2.3.1.4 Slide-in module LEDs

The slide-in module support 100BASE-FX media connection and with two diagnostic LEDs with the following definition:

LED	Operation
Link/Act	Link is present (Green), Activity (Blinking Green)
FDX/COL	Full-Duplex (Amber), Half-Duplex (Off), COL (Blinking Amber)

2.3.2 Port LEDs

Port LED indicators are located on the front panel for showing the operating status of each port.

2.3.2.1 Link/Act LED

Every port has a Link/Activity LED. Steady light (link state) indicated that the port has good linkage to its associated device. Flashing indicates there is traffic transverses the port. The following is table for LED definition.

Link/Activity LED	Status
Off	No Connection
Green	Connected as 100Mbps
Flashing Green	There is traffic transverses the port
Amber	Connected as 10Mbps
Flashing Amber	There is traffic transverses the port

If the port is connected but the Link/Activity LED is dark, check the following items:

1. The switching hub and the connected device's power are on or not
2. The port's cable is firmly seated in its connectors in the switching hub and in the associated device.
3. The connecting cable is good and with correct type
4. The connecting device, including any network adapter is functioning.

2.3.2.2 FDX/COL LED

A collision occurs when two stations within a collision domain attempt to transmit data at the same time. Intermittent flashing amber of the collision LED is normal; the contending adapters resolve each collision by means of a wait-then-retransmit algorithm. Frequency of collisions is an indicator of heavy traffic on the network.

If the FDX/COL light amber which means the port is under full-duplex operation or dark for half-duplex mode.

2.3.3 Uplink Port

The uplink port is an alternative port to port 24 and user could use this port for switch to hub or switch to switch connection without cross-over cable.

2.3.4 VLAN/TRUNK mode button

Push this button continuously will show the configuration of VLAN and Trunk groups. The sequence of displaying will be

VLAN-A -> VLAN-B -> VLAN-C -> VLAN-D -> VLAN-E -> VLAN-F then

Trunk-A -> Trunk-B -> Trunk-C -> Trunk-D -> Trunk-E -> Trunk-F

When you select any VLAN or Trunk group, the related ports belong to that group will have the link/act LED steady green. The status display will stay 2~3 seconds and all the LEDs will work normally after that.

2.3.5 Reset button

Press the reset button will reboot the whole system.

2.4 The Rear Panel

The rear panel of the hub is shown below

2.4.1 Power Connecting

For compatibility with electric service in most areas of the world, the switching hub's power supply automatically adjusts to line power in the range 100~240 VAC and 50~60 Hz.

Plug the female end of the power cord firmly into the receptacle on the rear panel of the switching hub. Plug the other end of the power cord into an electric service outlet then the power will be ready.

2.4.2 Console Port

Through the console port, it provides rich diagnostic information includes network statistics, link status and system setting. The operating mode of the console port is:

DTE (terminal mode)
9600 (baud rate)
n (non-stop bit)
8 (8 data bits)
1 (1 parity bit)

You could use a normal RS-232 cable connect to the null modem then plug into the console port on the device. After the connection, you could run any terminal emulation program (Winterm, Telix, … and so on) to enter the startup screen of the device. All the detail software operation, please refer to "Console Program" session.

3. Installing And Using SWH-2024D NWay Switching Hub

3.1 Installing The SWH-2024D NWay Switching Hub

The hub does not require software configuration. Users can immediately use any of the features of this product simply by attaching the cables and turning the power on.

3.1.1 Desktop Installation

To locate the switching hub on the desktop and place the hub on a clean, flat desk or table close to a power outlet. Plug in all network connections and the power cord, then the system is ready.

When deciding where to put the switching hub then you must ensure:

- It is accessible and cables can be connected easily
- Cabling is away from:
  Sources of electrical noise such as radios, transmitters and broadband amplifiers
  Power lines and fluorescent lighting fixtures.
- Water or moisture can not enter the unit
- Air flow around the unit and through the vents in the side of the case is not restricted (company recommend that you provide a minimum of 25mm inch clearance)

To prolong the operational life of your units:

- Never stack units more than eight high if freestanding.
- Do not place objects on top of any unit or stack
- Do not obstruct any vents at the sides of the case

3.1.2 Rack-Mount Installation (only for 19 inch product)

The switching hub may standalone, or may be mounted in a standard 19-inch equipment rack. Rack mounting produces an orderly installation when you have a number of related network devices. The switching hub is supplied with two mounting brackets and screws. These are used for rack mounting the unit.

Rack Mounting the Switching Hub
The switching hub should be able to fit in the 19 inch rack.

1. Disconnect all cables from the switching hub before continuing.
2. Place the unit the right way up on a hard, flat surface with the front facing toward you.
3. Locate a mounting bracket over the mounting holes on one side of the unit.
4. Insert the screws and fully tighten with a suitable screwdriver.
5. Repeat the two previous steps for the other side of the unit.
6. Insert the unit into the 19" rack and secure with suitable screws (not provided).
7. Reconnect all cables.

3.1.3 Installing Network Cables

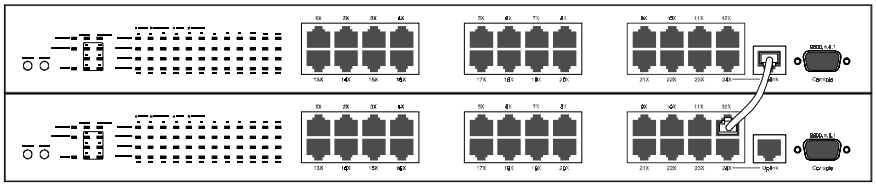
After placing the hub on the desktop, then we need to know how to connect the device to network.

3.1.3.1 Station Connections with Twisted-Pair Cable

Connect each station to the hub by a twisted-pair straight cable (10BASE-T or 100BASE-T cables). Plug one RJ-45 connector into a front-panel port of the hub, and plug the other RJ-45 connector into the station's network adapter.

3.1.3.2 Switch to Switch Connections with Twisted-Pair Cable

In making a switch to switch connection, you could use uplink port to connect another switch with no crossover cable. The uplink connector is wired to the same conductors as the port 24 connector, but with certain pin positions interchanged to provide a crossover, and thus allow using a straight cable to make a switch to switch connection.

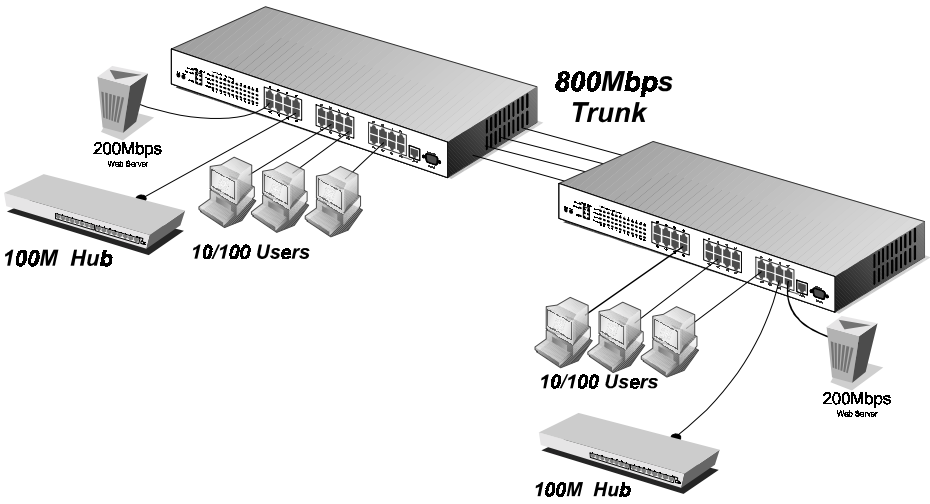


Keep in mind that the uplink connector is not an independent port. It is only an alternative connector to port 24 for switch to switch cabling. Port 24 is fully occupied whenever

1. A switch to switch connection is made through its uplink connector, or

2. Any kind of connection is made directly through the port 24 connector.

3.1.3.3 Network Application



4. Switch Operation

4.1 MAC Address Table and Learning

The switching hub is implemented with a MAC address table which is composed of many entries. Each entry is used to store the address information of network nodes on the network, including MAC address, port ID, etc. The information is the most important base to do packet filtering and forwarding.

When one packet comes in from any port, the switching hub will learn the source address, port ID, and the other related information in address table. Therefore, the content of the MAC table will update dynamically.

4.2 Filtering and Forwarding

When one packet comes in from any port of the switching hub, it will check the destination address besides the source address learning. The hub will look up the address table for the destination address. If not found, this packet will be forwarded to all the other ports except the port which this packet comes in. If found, and the destination address is located at different port from this packet comes in, the packet will be forwarded to the port where this destination address is located according to the information of address table. But, if the destination address is located at the same port as this packet comes in then this packet will be filtered.

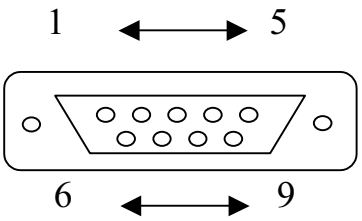
4.3 Store and Forward

Store-and-forward is one kind of packet-forwarding methodology. As a store-and-forward switching hub, it will store the complete packet in the internal buffer and do the complete error checking before transmitting to the network. Therefore, no error packets will disturb the network. It is the best choice when a network needs efficiency and stability.

5. Console Program

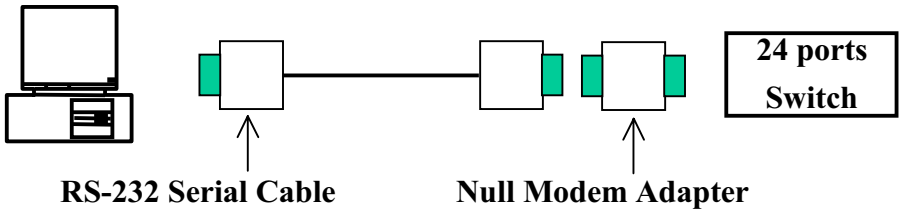
The SWH-2024D Switch has an RS-232 console port for direct console management

Pin	Description
1	DCD (Data Carrier Detect)
2	RX (Receive)
3	TX (Transmit)
4	DTR (Data Terminal Ready)
5	GND (Ground)
6	DSR (Data Set Ready)
7	RTS (Request To Send)
8	CTS (Clear To Send)
9	N/A



(RS-232 DB-9, DTE/male connector)

When connecting a terminal directly to the switch, use either a null modem cable or a null modem adapter on a serial (straight through) cable.

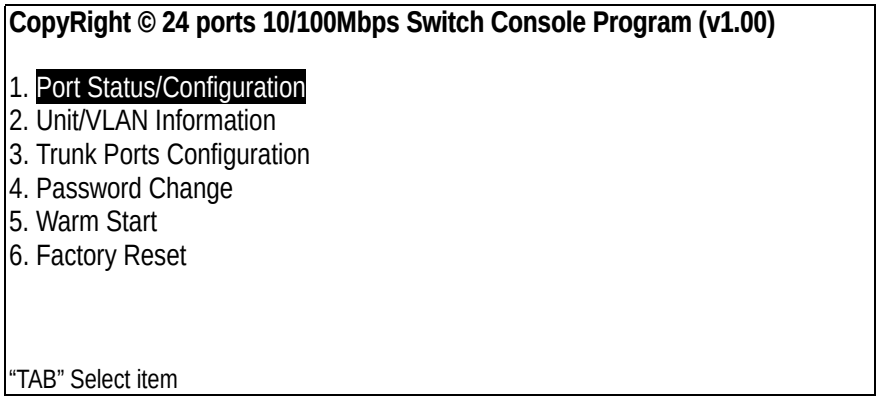


After power on, the Switch will run the Power-On-Self-Test (POST) as following:

```
CopyRight © 1998, 24 ports 10/100Mbps Switch Console Program (v1.00)

CPU TEST ••••••
```

After you login the console program successfully, the first startup screen will show as below



There are six items listed in the main menu screen.

1. Port Status/Configuration

This item is used to check the current port status and setup the port configuration, like full-duplex mode, NWay support, Back pressure and Flow control.

2. Unit/VLAN Information

The hardware version of the unit and the virtual LAN setting will display in this item

3. Trunk Ports Configuration

This item is used to setup the port trunk function. There are total six trunk groups could be configured as following table:

Trunk Group	Trunk Ports
Trunk-A	1, 2, 13, 14
Trunk-B	3, 4, 15, 16
Trunk-C	5, 6, 17, 18
Trunk-D	7, 8, 19, 20
Trunk-E	9, 10, 21, 22
Trunk-F	11, 12, 23, 24

4. Password Change

Use this item to change the administrator's password

5. Warm Start

Select this item will reset the system

6. Factory Reset

This item will reset the system to the factory default setting

The following is the function keys to navigate the console program screens

To do this …	Control Key
Highlight an item	Tab, moves from one item to the other or one field to the other
Select an item	Enter
Toggle between items in a choice field	Spacebar
Move to next field or item	Tab

The following are screens for console program.

Port Status/Configuration

```
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  [Port Status]
  Port Number                  : 1
  Port Link Status             : Up
  Port Speed                   : 100Base-TX

  [Port Configuration]
  Port Full Duplex             : <Enable>
  Port Nway Support            : <Nway Enable>
  Back Pressure                : <Enable>
  Flow Control                 : <Enable>

                 SAVE          EXIT

  "<", ">" : Prev/Next Port    "TAB" Select item    "SPACE" Toggle item
```

Flow Control: Enable or Disable
Back Pressure: Enable or Disable
Port Full Duplex: Enable or Disable
Port Nway Support: Enable or Disable

There are two portion of the port information displayed on the screen. The first one is [Port Status] and the detail function work as below:

Port Number: The number of the port is selected to be monitored or setup. You could use "<" and ">" to change the port number

Port Link Status: This item is used to display the link status of the port - link UP or link DOWN

Port Speed: The item is showing current link speed between the UTP port and the connected partner

The second portion is [Port Configuration] and users could use "SPACE" bar to change the setting. For example:

Port Full Duplex: Full-duplex capability of the port could be enabled or disabled.

NOTE: When the NWay capability is enabled, the full-duplex mode could not be disabled

Port NWay Support: This item is used to setup the NWay capability of the UTP port
Back Pressure: Enable or Disable the back pressure function of the UTP port under half-duplex operation
Flow Control: Enable or Disable the flow control function of the UTP port under full-duplex operation

NOTE: All the change of the port configuration will be real-time effected. The SAVE item is used to save all the configuration into the system PROM and the configuration will be boot up from the PROM after system power on or reset.

Unit/VLAN Information

```
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      [System Status]
      System Hardware Version      : 1.0
      VLAN
      Group-A: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
24
      Group-B:
      Group-C:
      Group-D:
      Group-E:
      Group-F:

      [VLAN Setting]
      Port Number      : 1
      Group-A          : <Yes>
      Group-B          : <No>
      Group-C          : <No>
      Group-D          : <No>
      Group-E          : <No>
      Group-F          : <No>

                    SAVE          EXIT


    "<", ">" : Prev/Next Port      "TAB" Select item      "SPACE" Toggle item
```

From the Unit/VLAN Information screen, you could read the system hardware version and the virtual LAN setting information. There are six virtual groups could be setup and you could read the real-time VLAN workgroups change immediately. You could use the "<" and ">" keystroke to select the designated port and assign the port to related virtual groups.

NOTE:

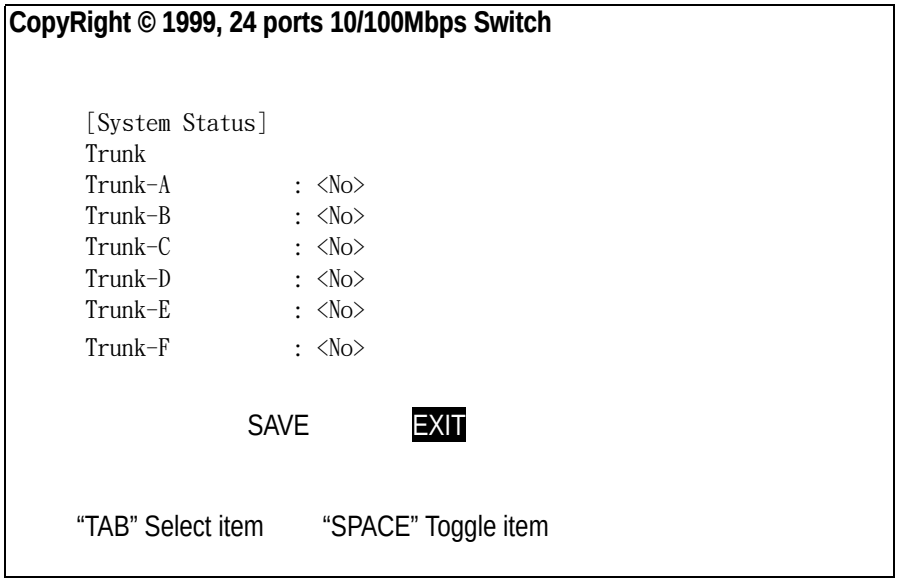
1. All the change of the port configuration will be real-time effected. The SAVE item is used to save all the configuration into the system PROM and the configuration will be boot up from the PROM after system power on or reset.
2. The virtual setting could be overlapped which means one port could belong to different virtual group

3. If the trunk is enabled then all the ports belong to that trunk need to be set in the same virtual workgroup. For example:

<Assumption>
Trunk A is enabled (Trunk A includes port 1, 2, 13, and 14)

<VLAN setting>
When the virtual LAN is setup, the port 1, 2, 13, and 14 must belong to the same VLAN groups.

Trunk Ports Configuration



The Port Trunk screen includes six port trunk groups could be setup by administrator. The port trunk group and UTP ports mapping is listed as below

When the port trunk is enabled, it could build up an 800Mbps bandwidth between switch to switch connection.

Password Change

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Password Change

Current Password:
Valid Characters: 0-9, A-Z, a-z
New Password:
Re-Confirm New Password:

NOTE: The maximum length of password is 15 characters and only the following characters are allowed in the password: 0-9, A-Z, a-z

Warm Start

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Want to do System Warm Start ? <Y/N>

POST .....

Factory Reset

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Want to reset system to factory default values ? <Y/N>

POST .....

6. Product Specifications

Standard	IEEE802.3, 10BASE-T IEEE802.3u, 100BASE-TX
Interface	RJ-45 x 24 NWay switching ports One uplink port (an alternative to port 24) One slide-in module for fiber connection on the back One RS-232 console port
Cable Connections	RJ-45 (10BASE-T) : UTP Category 3,4,5 RJ-45 (100BASE-TX) : UTP Category 5
Network Data Rate	Auto-negotiation (10Mbps, 100Mbps)
Transmission Mode	Auto-negotiation (Full-duplex, Half-duplex)
LED indications	System Power x1 Module x1 Fiber Link x1 VLAN x1, TRUNK x1 VLAN/Trunk x6 Port 100M Link/Activity FDX/COL Slide-in module Link/Act, FDX/COL
System Buffer Memory	3MByte
MAC Address Table	1K entries
Filtering/Forwarding Rate	10Mbps: 14,880pps/14,880pps 100Mbps: 148,800pps/148,800pps
Emission	FCC Class A, CE
Operating Temperature	0^0 ~ 55^0C (32^0 ~ 131^0F)
Operating Humidity	10% - 90%
Power Supply	100~240 VAC, 50/60 Hz